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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/045,128	10/26/2001	Manjunath Narayanaswamy	ADAPP206	2461
25920	7590	09/14/2004	EXAMINER	
MARTINE & PENILLA, LLP			VITAL, PIERRE M	
710 LAKEWAY DRIVE			ART UNIT	PAPER NUMBER
SUITE 170			2188	
SUNNYVALE, CA 94085				

DATE MAILED: 09/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/045,128

Applicant(s)

NARAYANASWAMY ET AL.

Examiner

Pierre M. Vital

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 August 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4-8,10-14,16-18 and 20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-8,10-14,16-18 and 20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 October 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on August 27, 2004 has been entered.

Response to Amendment

2. This Office Action is in response to applicant's communication filed August 27, 2004 in response to PTO Office Action mailed August 3, 2004. The Applicant's remarks and amendments to the claims and/or the specification were considered with the results that follow.

3. Claims 1-20 have been presented for examination in this application. In response to the last Office Action, claims 1, 7, 12 and 17 have been amended. Claims 3, 9, 15 and 19 have been previously canceled. No claims have been added. As a result, claims 1, 2, 4-8, 10-14, 16-18 and 20 are now pending in this application.

Response to Arguments

4. Applicant's arguments filed June 29, 2004 have been fully considered but they are not persuasive. As to the remarks, Applicant asserted that:

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(a) Jeffries does not teach or suggest accumulating a plurality of commands in a queue while a first command is being processed by the storage medium.

Examiner respectfully traverses applicant's arguments for the following reasons. Examiner would like to point out that all incoming requests are stored in a queue of pending requests and each request being processed must complete prior to starting the next as detailed in col. 12, lines 24-28. Thus, it can be clearly seen that as a request or command is being processed, other incoming requests or command will be put in the queue pending the time when they will be processed as claimed by applicant. Examiner agrees with applicant that Jeffries does not teach each command including a CDB and SGL. However, the McDonald reference has been used to cure this deficiency as detailed in the previous Office Action.

(b) Jeffries does not teach that commands are not combined.

Even though Jeffries discloses that each disk drive completes a request prior to starting the next (col. 12, lines 28-29); Jeffries also teaches that reads to contiguous disk blocks are combined into one disk read (col. 29, lines 49-55). Thus, it can be clearly seen that if multiple reads are combined into one disk read, each of these combined single disk reads can be completed prior to starting the next consistent with the invention.

- (c) Jeffries does not teach examining commands for like commands.

Even though Applicant's arguments that the related sequences of atomic operations are the order of the operations and are not like commands may be true, Examiner would like to point out that it is the operation requests that are fragmented into atomic operations. Thus, the atomic operations are read and write requests being processed in one cycle. In this way, the combined commands can be processed in predetermined time intervals (i.e., one cycle) with the first needing to complete prior to starting the next.

- (d) Jeffries does not teach checking if any of the plurality of commands are like commands.

Note that Jeffries discloses that multiple read or write requests must exist in the queue in order to combine these commands (col. 41, lines 12-32). Thus, it can be clearly seen that Jeffries does check for like commands as claimed by Applicant.

- (e) Jeffries does teach the plurality of commands in the queue include both contiguous as well as non-contiguous commands.

The newly added limitation that "the plurality of commands in the queue including contiguous and non-contiguous commands" introduced in the independent claims does not remove the Jeffries reference from reading upon the claims. Jeffries discloses a scatter/gather operation, which includes the transfer of contiguous and non-contiguous requests (col. 6, lines 28-33).

Claim Objections

5. Claims 1, 6, 7, and 17 are objected to because of the following informalities:

In claim 1, line 7, after "memory", please insert --,--;

In claim 1, line 11, after "including", please change "," to --:--.

In claim 6, line 1, after "claim", replace "3" with -1--.

In claim 7, line 6, after "memory", please insert --,--;

In claim 7, line 10, after "including", please change "," to --:--.

In claim 17, line 13, after "including", please change "," to --:--.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1, 2, 4, 7-8, 10-14, 17, 18 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jeffries (US5,974,544) and McDonald et al. (US6,138,176).

As per claim 1, Jeffries discloses a method for merging contiguous like commands for transfers between a storage medium and memory, comprising:
accumulating a plurality of commands in a queue while a first command is being

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processed by the storage medium [*pending requests are maintained in a queue and a request must complete prior to starting the next*; col. 12, lines 24-28]; the plurality of commands in the queue including contiguous and non-contiguous commands [*scatter/gather includes contiguous and non-contiguous requests*; col. 6, lines 28-33]; examining the plurality of commands in the queue while the first command is being processed , the examining further including, checking if any of the plurality of commands are like commands [col. 41, lines 12-14; *related sequences of atomic operations are kept together*; col. 5, lines 7-13], each of the like commands corresponding to a file stored on a storage medium and determining if any of the files on the storage medium are stored contiguously with respect to one another [*reads to contiguous disk blocks are combined*; col. 29, lines 49-50; *if a new read comes adjacent to the last n, sequential read may be in progress*; col. 7, lines 53-57; *controller 100 provides a sorting of the queue of requests if two or more requests involve close proximity sectors*; col. 70, lines 52-59]; combining the like commands corresponding to contiguous files as a combined command [*reads to contiguous disk blocks are combined into one disk read*; col. 29, lines 49-50]; and issuing the combined command to the storage medium upon completion of the processing of the first command [*reads to contiguous disk blocks are combined*; col. 29, lines 49-50; *a request must complete prior to starting the next*; col. 12, lines 26-28].

However, Jeffries does not specifically teach each read and write command includes a command data block (CDB) and a scatter gather list (SGL), the CDB being configured to identify the location of a file on the storage medium, the SGL being

configured to include data pointers; and examining the CDB and SGL as recited in the claim.

McDonald discloses each read and write command includes a command data block (CDB) and a scatter gather list (SGL), the CDB being configured to identify the location of a file on the storage medium [col. 5, lines 8-18], the SGL being configured to include data pointers; and examining the CDB and SGL [col. 9, lines 40-43; col. 10, lines 1-4] for providing a high degree of performance by generating and transmitting appropriate data packets and specifying a disk transfer operation (col. 17, lines 36-41). Since the technology for implementing a plurality of commands including a command data block (CDB) and a scatter gather list (SGL) was well known, and since a command data block (CDB) and a scatter gather list (SGL) provides a high degree of performance, an artisan would have been motivated to implement a plurality of commands including a command data block (CDB) and a scatter gather list (SGL) in the system of Jeffries. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use a plurality of commands including a command data block (CDB) and a scatter gather list (SGL) because a plurality of commands including a command data block (CDB) and a scatter gather list (SGL) were well known to benefit with providing a high degree of performance by generating and transmitting appropriate packets and specifying a disk transfer operation as taught by McDonald.

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As per claim 2, Jeffries discloses the storage medium is a hard drive [*accessing a byte stored in a hard disk drive*; col. 2, lines 22-45].

As per claim 4, Jeffries further discloses providing a multithread environment, the multithread environment allowing multiple read and write commands to be processed concurrently [*multiple outstanding I/Os occur concurrently on each logical drive*; col. 29, lines 13-15].

As per claim 7, Jeffries discloses a method for combining commands for data transfer between a drive and memory, comprising: receiving multiple read or write commands in a queue [*pending requests are maintained in a queue*; col. 12, line 24]; the plurality of commands in the queue including contiguous and non-contiguous commands [*scatter/gather includes contiguous and non-contiguous requests*; col. 6, lines 28-33]; processing a first command of the multiple read or write commands [*requests are handled serially and a request must complete prior to starting the next*; col. 12, lines 24-28]; examining the multiple read or write commands, the examining including, identifying like commands of the multiple read or write commands while processing the first command [col. 41, lines 12-14; *related sequences of atomic operations are kept together*; col. 5, lines 7-13; *pending requests are maintained in a queue and a request must complete prior to starting the next*; col. 12, lines 24-28]; each of the like commands being associated with a file stored on the drive, and ascertaining which of the files associated with the like commands are contiguous files [*reads to contiguous disk blocks are combined*; col. 29, lines 49-50; *if a new read comes adjacent to the last n, sequential read may be in progress*; col. 7, lines 53-57; *controller 100 provides a sorting of*

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the queue of requests if two or more requests involve close proximity sectors; col. 70, lines 52-59]; creating a combined command, the combined command being configured to consolidate the identified like commands being associated with contiguous files [reads to contiguous disk blocks are combined; col. 29, lines 49-50]; and issuing the combined command to the drive [reads to contiguous disk blocks are combined; col. 29, lines 49-50; a request must complete prior to starting the next; col. 12, lines 26-28].

However, Jeffries does not specifically teach each read and write command includes a command data block (CDB) and a scatter gather list (SGL), the CDB being configured to identify the location of a file on the storage medium, the SGL being configured to include data pointers; and examining the CDB and SGL as recited in the claim.

McDonald discloses each read and write command includes a command data block (CDB) and a scatter gather list (SGL), the CDB being configured to identify the location of a file on the storage medium [col. 5, lines 8-18], the SGL being configured to include data pointers; and examining the CDB and SGL [col. 9, lines 40-43; col. 10, lines 1-4] for providing a high degree of performance by generating and transmitting appropriate packets and specifying a disk transfer operation (col. 17, lines 36-41). Since the technology for implementing a plurality of commands including a command data block (CDB) and a scatter gather list (SGL) was well known, and since a command data block (CDB) and a scatter gather list (SGL) provides a high degree of performance, an artisan would have been motivated to implement a plurality of commands including a command data block (CDB) and a scatter gather list (SGL) in the system of Jeffries.

Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use a plurality of commands including a command data block (CDB) and a scatter gather list (SGL) because a plurality of commands including a command data block (CDB) and a scatter gather list (SGL) were well known to benefit with providing a high degree of performance by generating and transmitting appropriate packets and specifying a disk transfer operation as taught by McDonald.

As per claim 8, Jeffries further discloses providing a multithread environment, the multithread environment allowing multiple read and write commands to be processed concurrently [*multiple outstanding I/Os occur concurrently on each logical drive*; col. 29, lines 13-15].

As per claim 10, Jeffries discloses the queue has a capacity of 256 commands [*the controller has 256K of RAM*; col. 7, lines 20-21].

As per claim 11, Jeffries further discloses processing the combined command and generating one interrupt for the processed combined command [*upon completion of the transfer, the event completion interrupt is serviced*; col. 22, lines 64-67].

As per claim 12, Jeffries discloses an apparatus for merging contiguous like commands, comprising an operating system, the operating system generating read and write commands [*CPU is operating in a multiprogramming environment and generates read/write requests*; col. 3, lines 14-30]; a storage media, the storage media being configured to process read and write commands [*this allows parallel writes by the disk drives*; col. 3, lines 15-

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16], the read and write commands being associated with files stored on the storage media [*read or write requests access to stripes of sectors*; col. 46, lines 50-58]; and a driver queue, the driver queue being configured to receive the read and write commands from the operating system [*request is enqueued on the disk driver's queue or the transfer driver's queue*; col. 21, lines 46-52], the plurality of commands in the queue including contiguous and non-contiguous commands [*scatter/gather includes contiguous and non-contiguous requests*; col. 6, lines 28-33], the read and write commands being examined in the driver queue to identify like commands associated with contiguous files on the storage media [col. 41, lines 12-14; *reads are enqueued in the disk driver's queue and writes are enqueued in the transfer driver's queue*; col. 21, lines 48-50; *if a new read comes adjacent to the last n, sequential read may be in progress*; col. 7, lines 53-57; *controller 100 provides a sorting of the queue of requests if two or more requests involve close proximity sectors*; col. 70, lines 52-59], the identified commands being combined into one command [*reads to contiguous disk blocks are combined*; col. 29, lines 49-50], the one command being issued to the storage media [*reads to contiguous disk blocks are combined*; col. 29, lines 49-50; *a request must complete prior to starting the next*; col. 12, lines 26-28].

However, Jeffries does not specifically teach each read and write command includes a command data block (CDB) and a scatter gather list (SGL), the CDB being configured to identify the location of a file on the storage medium, the SGL being configured to include data pointers; and examining the CDB and SGL as recited in the claim.

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McDonald discloses each read and write command includes a command data block (CDB) and a scatter gather list (SGL), the CDB being configured to identify the location of a file on the storage medium [col. 5, lines 8-18], the SGL being configured to include data pointers; and examining the CDB and SGL [col. 9, lines 40-43; col. 10, lines 1-4] for providing a high degree of performance by generating and transmitting appropriate packets and specifying a disk transfer operation (col. 17, lines 36-41). Since the technology for implementing a plurality of commands including a command data block (CDB) and a scatter gather list (SGL) was well known, and since a command data block (CDB) and a scatter gather list (SGL) provides a high degree of performance, an artisan would have been motivated to implement a plurality of commands including a command data block (CDB) and a scatter gather list (SGL) in the system of Jeffries. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use a plurality of commands including a command data block (CDB) and a scatter gather list (SGL) because a plurality of commands including a command data block (CDB) and a scatter gather list (SGL) were well known to benefit with providing a high degree of performance by generating and transmitting appropriate packets and specifying a disk transfer operation as taught by McDonald.

As per claim 13, Jeffries discloses the storage media is a hard drive [*accessing a byte stored in a hard disk drive*; col. 2, lines 22-45].

As per claim 14, Jeffries discloses further including: a multithread environment, the multithread environment allowing for multiple combined commands to be processed

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concurrently [*multiple outstanding I/Os occur concurrently on each logical drive*; col. 29, lines 13-15].

As per claim 17, Jeffries discloses combining commands for data transfer between a drive and memory, comprising: receiving multiple read or write commands in a queue [*pending requests are maintained in a queue*; col. 12, line 24]; the plurality of commands in the queue including contiguous and non-contiguous commands [*scatter/gather includes contiguous and non-contiguous requests*; col. 6, lines 28-33]; processing a first command of the multiple read or write commands [*requests are handled serially and a request must complete prior to starting the next*; col. 12, lines 24-28]; combining multiple read or write commands [*reads to contiguous disk blocks are combined into one disk read*; col. 29, lines 49-50], the combining including, identifying like commands of the multiple read or write commands while processing the first command [col. 41, lines 12-14; *related sequences of atomic operations are kept together*; col. 5, lines 7-13; *pending requests are maintained in a queue and a request must complete prior to starting the next*; col. 12, lines 24-28], each of the like commands being associated with a file stored on the drive, ascertaining which of the files associated with the like commands are contiguous files [*if a new read comes adjacent to the last n, sequential read may be in progress*; col. 7, lines 53-57; *controller 100 provides a sorting of the queue of requests if two or more requests involve close proximity sectors*; col. 70, lines 52-59]; creating a combined command, the combined command being configured to consolidate the identified like commands being associated with contiguous files [*reads to*

contiguous disk blocks are combined; col. 29, lines 49-50]; issuing the combined command to the drive [reads to contiguous disk blocks are combined; col. 29, lines 49-50; a request must complete prior to starting the next; col. 12, lines 26-28].

However, Jeffries does not specifically teach each read and write command includes a command data block (CDB) and a scatter gather list (SGL), the CDB being configured to identify the location of a file on the storage medium, the SGL being configured to include data pointers; and examining the CDB and SGL as recited in the claim.

McDonald discloses each read and write command includes a command data block (CDB) and a scatter gather list (SGL), the CDB being configured to identify the location of a file on the storage medium [col. 5, lines 8-18], the SGL being configured to include data pointers; and examining the CDB and SGL [col. 9, lines 40-43; col. 10, lines 1-4] for providing a high degree of performance by generating and transmitting appropriate packets and specifying a disk transfer operation (col. 17, lines 36-41). Since the technology for implementing a plurality of commands including a command data block (CDB) and a scatter gather list (SGL) was well known, and since a command data block (CDB) and a scatter gather list (SGL) provides a high degree of performance, an artisan would have been motivated to implement a plurality of commands including a command data block (CDB) and a scatter gather list (SGL) in the system of Jeffries. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to use a plurality of commands including a command data block (CDB) and a scatter gather list (SGL) because a plurality of commands including a command data

block (CDB) and a scatter gather list (SGL) were well known to benefit with providing a high degree of performance by generating and transmitting appropriate packets and specifying a disk transfer operation as taught by McDonald.

However, Jeffries and McDonald do not specifically teach a computer readable media having program instructions for performing the steps of claim 17. However, one of ordinary skill in the art would have recognized that a computer readable medium (i.e., floppy, CD-ROM, etc.) carrying program instructions for implementing a method is generally well known in the art, because it would have facilitated the transportation and installation of the method on other systems. For example, a copy of the Microsoft Windows operating system can be found on a CD-ROM from which Windows can be installed onto other systems, which is a lot easier than running a long cable or hand typing the software into another system. The examiner takes Official Notice of this teaching. Therefore, it would have been obvious to one of ordinary skill in the art to put Jeffries and McDonald's program on a computer readable medium, because it would have facilitated the transporting, installing and implementing of Jeffries and McDonald's program on other systems.

As per claim 18, Jeffries discloses further including program instructions for providing a multithread environment [*multiple outstanding I/Os occur concurrently on each logical drive*; col. 29, lines 13-15].

As per claim 20, Jeffries discloses the drive is a hard drive [*accessing a byte stored in a hard disk drive*; col. 2, lines 22-45].

8. Claims 6 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jeffries (US5,974,544) and McDonald et al (US6,138,176) and further in view of Chisholm et al (US5,802,546).

As per claims 6 and 16, the combination of Jeffries and McDonald and Chisholm discloses the claimed invention as detailed above per claims 3 and 15 in the previous paragraphs.

However, Jeffries and MacDonald do not specifically teach the SGL of a combined command is expanded from the SGL of a non-combined command as recited in the claims.

Chisholm further discloses the SGL of the combined command is expanded from the SGL of a non-combined command [*during a scatter/gather operation on both sides, data gathered on one side equals data scattered on the other side*; col. 5, line 58 – col. 6, line 14].

It would have been obvious to one of ordinary skill in the art, having the teachings of Jeffries and McDonald and Chisholm before him at the time the invention was made, to modify the system of Jeffries to include SGL of the combined command expanded from the SGL of a non-combined command because it would have improved memory utilization and facilitated data transfer by providing concurrent scatter/gather operation on both sides and by minimizing processing unit intervention in data block transfers [col. 13, lines 26-31] as taught by Chisholm.

9. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jeffries (US5,974,544) and McDonald et al (US6,138,176) and further in view of Row et al (US5,802,366).

As per claim 5, the combination of Jeffries and McDonald discloses the claimed invention as detailed above in the previous paragraphs. However, Jeffries and MacDonald do not specifically teach the combined command is transparent to the operating system as recited in the claim.

Row discloses the concept of processing command transparent to the operating system [col. 8, lines 28-32].

It would have been obvious to one of ordinary skill in the art, having the teachings of Jeffries and McDonald and Row before him at the time the invention was made, to modify the system of Jeffries and McDonald to include a combined command is transparent to the operating system because it would have improved file server performance by eliminating the operating system from virtually all network, file and storage processing as taught by Row.


Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Pierre M. Vital whose telephone number is (703) 306-5839. The examiner can normally be reached on Mon-Fri, 8:30 am - 6:00 pm, alternate Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mano Padmanabhan can be reached on (703) 306-2903. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

September 10, 2004


Pierre M. Vital
Examiner
Art Unit 2188